LIVERMORE LAB REPORT

A weekly compendium of media reports on science and technology achievements at Lawrence Livermore National Laboratory, Sept. 22-26, 2014. Though the Laboratory reviews items for overall accuracy, the reporting organizations are responsible for the content in the links below.

SCIENTIFIC AMERICAN LIFE'S JUMPSTART

Researchers propose localized electric fields on the surface of minerals may have played a part in directing the chemistry that led to the ingredients of life.

Quantum mechanical simulations of a famous experiment, in which simple molecules are exposed to an electrical discharge to produce amino acids, may have happened on the early Earth as a precursor to life.

The researchers at UPMC in Paris, France, and the Institute for Chemical and Physical Processes in Messina, Italy, also suggest that localized electrical fields on the surface of minerals may have had a bigger part in prebiotic chemistry.

Nir Goldman, a researcher in prebiotic chemistry at Lawrence Livermore, says that the work does provide "new insights into the idea that electrical discharges, for example lightning, could have played a role in the formation of prebiotic molecules on early Earth."

Goldman adds: "One criticism is that the authors chose to use a somewhat reduced or hydrogen-rich mixture in their study, whereas the atmosphere on early Earth is thought to have been carbon dioxide-rich, which could entail very different chemistry in the presence of an electric field. Similar studies on a more realistic prebiotic mixture could yield interesting predictions for future experiments."

To read more, go to *Scientific American*.

HPC wire ON THE CUSP OF A NEW ERA

High performance computing is moving into unchartered territory.

Rob Neely, associate division lead for the Center for Applied Scientific Computing at Lawrence Livermore traced the history of high performance computing as defined by the dominant platforms, starting with mainframes and continuing through vector architectures, massively parallel architectures and the current emerging trends that will define the upcoming exascale era during a recent HPC workshop.

Neely identifies three major eras of computing: mainframes, vector era and distributed memory era (MPP). There's a fourth emerging era that has so-far proved to be difficult to define.

"There is no one defining feature of this new era like there has been in the past," Neely said. "This many-core era, for lack of a better term, is where we are now. It's characterized by accelerators, lots and lots of simple cores. It's really all about extracting parallelism from your applications."

To read more, go to *HPC Wire*.

GEORGETOWN UNIVERSITY AN EDUCATIONAL PACT

LLNL Director Bill Goldstein and Georgetown President John DeGioia sign a memorandum of understanding, renewing the partnership and expanding areas of collaboration.

Lawrence Livermore Director Bill Goldstein and Georgetown President John DeGioia recently renewed their institutional commitment by signing a memorandum of understanding for an additional five years to expand collaborative work in the areas of cyber security, biosecurity, nonproliferation and global climate, energy and environmental sciences.

This renewal represents a significant expansion of an MOU originally signed in December 2009 and is a framework to broaden LLNL collaborations university-wide, including the Georgetown University Medical Center. The new MOU expands the fields of study to include data science and data analytics; bio-security; emergency and disaster management; global climate, energy and environment; food safety and security; and biotechnology (including such fields as infectious diseases, drug discovery, regenerative medicine, and urban resilience).

The LLNL-Georgetown partnership has already achieved success, including the creation and successful launch of a master's program in emergency and disaster management (EDM), which began in fall 2013 and is now in its second year. LLNL also worked with Georgetown to establish a biotechnology seminar series and host summer interns from the Biotechnology Masters of Science Program.

To read more, go to the Georgetown University website.

redOrbit **DEAD OR ALIVE**

The blue dot in this image marks the spot of an energetic pulsar -- the magnetic, spinning core of a star that blew up in a supernova. Credit: NASA/JPL-Caltech/SAO

A supernova is the cataclysmic death of a star, but it seems its remnants shine on. When the most massive stars explode as supernovae, they don't fade into the night, but sometimes glow wildly with high-energy gamma rays.

NASA's Nuclear Spectroscopic Telescope Array, or NuSTAR, which Lawrence Livermore plays a key role, is helping to untangle the mystery. The observatory's high-energy X-ray cameras were able to peer into a particular site of powerful gamma rays and confirm the source: spinning, dead star called a pulsar. Pulsars are one of several types of stellar remnants that are left over when stars blow up in supernovae.

To read more, go to *Red Orbit*.

BBC NEWS THE ELEMENTS OF DISCOVERY

Element 114, flerovium, and element 116, livermorium, are the most recent elements named on the periodic table.

Plutonium is not the only element that is manmade. It has been used to power batteries on several space missions. The Voyager space probes contain batteries that still provide an estimated 300 watts of power today, down from 500 watts when they were launched in 1977. The Mars rover also relies on plutonium's heat to stop its joints freezing, as well as for power.

What about elements created beyond element 94? When scientist Ernest Lawrence invented the cyclotron -- a device for accelerating particles around a circular chamber using electromagnets -- the creation of new elements changed. It was used to transform one element into another.

A total of 24 new elements have been confirmed to date and two more are pending confirmation, so the periodic table now includes up to 118 elements.

The names of these new elements reflect the preoccupations of the people who discovered them. Naturally there are berkelium, dubnium and darmstadtium, as well as livermorium -- named after the Lawrence Livermore National Laboratory.

To read more, go to *BBC News Magazine*.
